

# Sampler of Projects Available for 2009 Interns at NASA Goddard Space Flight Center

Level of Applicant	Title of Project	Project Abstract	Expectations of Intern
Graduate/Masters, Graduate/Doctorate,	Graduate Internship for Museum Studies Student	The intern will support GSFC's Informal Education community and the Visitor Center on a project that reflects Goddard's science and engineering. This NASA field center is a major U.S. laboratory for developing and operating unmanned scientific spacecraft in Earth Science, Astrophysics, Heliophysics and Planetary Science. The graduate intern will develop a specific project to implement based on the Goddard Visitor Center and the Goddard Informal Education Community needs, and the focus area and expertise of the intern. The intern will also perform additional tasks related to Informal Education programs and events including those with partner museums and science centers. One of the potential projects is supporting the development of an exhibit that reflects Goddard's science and engineering.	The intern will be expected to support the Goddard Informal Education community at a full time level including a small number of events or programs that may occur on a weekend or after-hours. The intern will work with the Goddard Education Office and education specialists, scientists and engineers, and museum partners as appropriate. Excellent communication skills, a commitment to producing results, and the ability to work effectively as part of a team are essential.
High School (age 16 minimum), Freshman/Sophomore Undergraduate,	Goddard Visitor Center Summer Internship	The Visitor Center at the NASA Goddard Space Flight Center offers a unique destination that provides valuable inspirational and educational experiences for all ages. We provide many unique programs, special events and presentations that highlight Goddard's Earth and Space Science, engineering and technology work, and we demonstrate what is current and unique about Goddard and NASA through exciting interactive experiences for the public. We are looking for a dedicated, enthusiastic and friendly intern to support our Visitor Center this summer. The intern would be working with visitors of all ages, and would be trained on our exhibits and hands on activities available for children. In addition, the intern would be responsible for interacting with the public including talking about the exhibits and programs answering the phone as needed. We would work with the intern to make sure the duties included areas of interest and expertise of the intern.	The intern would be expected to work at the Visitor Center for 40 hours and must be available to be at the Visitor Center from 10am to 5pm Tuesday through Friday during our open hours of operation. The intern may be asked to support one or two weekend events during the summer. The intern must have excellent communication skills, the ability to work with others, and the ability to pitch in and support the staff at the Visitor Center.
Freshman/Sophomore Undergraduate, Junior/Senior Undergraduate,	NPP Mission Readiness, Readiness Test Development Preparation and Execution	The intern for the mission readiness group will assist in development, preparation and execution of Mission Tests (OREs and Rehearsals). Activities will include finalization of detailed test plans and timelines, compilation of products required for test execution, preliminary execution and assessment of the plan and operational products and final execution and observation of the test plans. The successful candidate must be detailed oriented, skilled in technical writing, and proficient in standard Microsoft Office tools. Prior experience with structure programming languages, testing experience and a background in system operations are desired but not required. Development of test plans and timelines will require the ability to learn basic functionality of the NPP space and ground segment at a quick pace. This knowledge will be used to assist Mission Rehearsal Directors prepare a comprehensive plan to test discrete phases of the mission while emphasizing the use of operational elements, operational products and processes, as well as team interaction. Preliminary execution and assessment of the plan and operational products will be performed on a local system representative of the operational ground system that will be used at the NOAA Satellite Operations Facility (NSOF). Final execution of OREs and rehearsals will be performed at the NSOF, located in Suitland Maryland. Travel to the NSOF facility can be arranged if the candidate does not have transportation.	The successful candidate must be detailed oriented, skilled in technical writing, and proficient in standard Microsoft Office tools. Prior experience with structure programming languages, testing experience and a background in system operations are desired but not required. Development of test plans and timelines will require the ability to learn basic functionality of the NPP space and ground segment at a quick pace.
Junior/Senior Undergraduate,	Micro- and Nanotechnology Development for Advanced Liquid Analysis Instrumentation for Planetary Science	This project is focused on developing a microfluidic means of analyzing and detecting organic molecules, using silicon-based materials and microfabrication techniques, for use in future astrobiology missions. Work may include clean room fabrication and optimization of nanoscale and microfluidic components, including the use of electron-beam and photolithography for patterning, modification of silicon-based substrates using reactive ion etching and wet chemistry, vacuum evaporation techniques to deposit metal electrodes for	The intern should be an independent and self-motivated worker. Prior laboratory, clean room, and microfabrication experience is critical to the project; this will allow the intern to "hit the ground running" for a meaningful and rewarding internship experience. The intern should be able to work well in a team

		device fabrication, and MEMS bonding methods to integrate microfluidic components. Additional work might include testing and characterization of nanoelectronic devices, scanning electron microscopy for evaluation of microscale and nanoscale components, and atomic force microscopy for imaging and manipulation of nanoscale structures. Opportunities to participate in other project work include growth of single-walled and multi-walled carbon nanotubes for novel coating applications and <i>in vacuo</i> testing of various field emitter materials for use in a miniaturized, low-power electron gun.	environment, communicate his/her ideas and results, bring creativity to the work, and survey and interpret relevant literature. The intern will be expected to attend weekly group meetings to give periodic updates on his/her progress and prepare a power point presentation at the end of the summer for branch members and management.
Freshman/Sophomore Undergraduate, Junior/Senior Undergraduate,	Electrical, Electronic, & Electromechanical (EEE) Parts Engineering research for various part commodities directly related to space applications	Electronic Parts Engineering: Conduct test on selected EEE parts, determined by the mentor, to determine their reliability and performance characteristics. Assists in the test and evaluation of conventional aerospace electronic systems or equipment with the assistance of the Parts Analysis Lab personnel. Participates in test programs that are required in order to certify the compliance of an electronic system with mission requirements derived from the mentor. Observes tests of initial production and other critical tests of electronic equipment or systems and reports findings to the mentor. Conduct circuit simulation models to determine possible failure modes of electronic parts.	The expectations of the summer intern to accomplish are giving an written/oral presentation of there findings with their research and testing of EEE Parts (outlined by the mentor), learn the various types of electronic parts that are used and tested in space applications, learn and operate scientific/engineering lab equipment in the measurements of possible failure modes in electronic parts, and be able to work with lab personnel and engineers on their research.
Graduate/Masters, Graduate/Doctorate,	Intelligent Framework for Autonomous Exploration Systems	NASA GSFC is looking for candidates for a graduate student internship using the LogicNets expert system to develop an intelligence modeling and runtime environment for autonomous robotic systems. These intelligence models will be embedded in a variety of vehicles and will control the vehicles during various missions and tasks in different environments. The test-bed framework will also provide a means for testing new exploration technologies, procedures, and techniques. The student will learn the LogicNets program and use it and incorporate Goddard software procedures and rules to develop the robotic test system, thereby populating the LogicNets framework with vehicle and environmental information and parameters for testing. The student will also collaboratively test learning algorithms and develop a software framework independent of any specific type of vehicle.	The student is expected to integrate information, rules and algorithms, in a rudimentary fashion, to the LogiNets system within the context of an autonomous exploration example
Freshman/Sophomore Undergraduate, Junior/Senior Undergraduate,	Graphic Designer for Astrophysics Science Division	High-quality graphics are an essential component of public understanding of the scientific research and missions in the Astrophysics Science Division at NASA Goddard. 2009 has been designated as the International Year of Astronomy and the Education and Public Outreach (EPO) team in the Astrophysics Science Division is working on several projects to highlight IYA. The selected intern will work with the EPO team to design graphics that can be used in a variety of settings and projects. These include EPO products such as curriculum support materials, posters, CDs and DVDs, etc. The graphics will also be used in press releases, fliers, brochures, and websites that discuss the science and missions in the ASD.	The intern will be expected to work collaboratively with the Education and Public Outreach team in the Astrophysics Division. (S)he must be capable of understanding a description of a scientific topic or mission and design graphics appropriately. The intern must have significant experience with graphic design software and created graphics for print and online applications (such as websites and games). (S)he will be expected to show initiative but also be responsive and amenable to suggested changes.
Junior/Senior Undergraduate, Graduate/Masters, Graduate/Doctorate,	Precision measurement of the LISA Optical Assembly Articulation Mechanism	The Laser Interferometer Space Antenna (LISA) mission, a space based gravitational wave detector, uses laser metrology to measure distance fluctuations between proof masses aboard three spacecraft. Each spacecraft has two optical assemblies that track the other two satellites. To perform the tracking, each optical assembly needs to rotate a maximum of +/-1.5 degrees in one axis, with an angular resolution of 0.5 nrad. As no commercial mechanism exists with this capability, the LISA Project developed a new system capable of meeting these challenging requirements. A laboratory testbed is currently under development to test the current design of the mechanism that will perform the precision pointing. This project will involve building up, operating, and debugging the testbed.	The intern will work as part of the team of engineers and scientists developing the testbed. Several projects are available that include development of the data acquisition and control system, installation and operation of the metrology system, and building up of the mechanical system (flex pivots, actuators, linkages, etc.). Laboratory experience with mechanisms, precision metrology, control systems, and data acquisition are a plus.
Junior/Senior Undergraduate, Graduate/Masters, Graduate/Doctorate,	Optical Properties of Astronomical Silicates in the Infrared	Astronomical dust is ubiquitous. It has been found in our own solar system, around nearby stars with debris disks, in star formation regions, and even in far-distant galaxies. This dust shields sources from our view at optical wavelengths, reprocesses short-wavelength light to longer wavelengths, and provides an environment where planets can form and grow. This program is designed to directly address two major questions: (1) What are the optical properties of dust grains in the far-infrared? and (2) How do these properties vary as a	The successful candidate will work with the project team on one or more of the areas listed above, depending upon the interest and expertise of the intern. Because of the cross-disciplinary nature of this program, we encourage interest from a wide range of applicants. A successful intern will show dedication to the project,

		function of wavelength, temperature, and crystallinity? By using five different experimental apparatus, we are able to derive the complex dielectric constant for a wide range of materials. In turn, this allows us to predict spectral signatures that may be present in spectra of astronomical sources. We are looking for a student to participate in this program. A successful applicant will be involved in one or more of the following areas: (1) Developing new experimental hardware; (2) Acquisition and analysis of data from different experiments; (3) Application of data to existing astronomical observations and/or to theoretical models of dust behavior. Skills and disciplines listed above are of value, but none are strictly required.	as well as the ability to "self-start". He/she will have the opportunity to learn about the roles dust plays in astrophysics, as well as in planetary science, while also learning about the fabrication and operation of new experimental apparatus.
Junior/Senior Undergraduate, Graduate/Masters, Graduate/Doctorate, Elementary/Secondary Teacher,	Space Science Data Analyst	Assist data acquisition team in the preparation and archiving of data from legacy spacecraft, in particular, the International Sun-Earth Explorer (ISEE) spacecraft. Activities include, among others, evaluation and preparation of data sets (primarily time-series data), custom adjustment of conversion process, assessment of output data quality, data and metadata archiving. Some sample science analysis using the data will be encouraged to include, as appropriate, written and oral presentation of results. (very limited partial support available from NASA grant)	Facility in use of PC or Mac desktop to access Web-based sites and databases, extract and manipulate data sets in spreadsheet or database of choice, along with pre-existing software interfaces. Requires good organizational and analysis skills. Student presentation (oral and written) will also be expected.
Freshman/Sophomore Undergraduate, Junior/Senior Undergraduate, Graduate/Masters, Graduate/Doctorate,	Hidden Impact Basins and the Early Bombardment History of the Moon, Mars and Earth	In order to understand the earliest crustal evolution of the Earth (for which little record exists), we study the early crustal evolution of the Moon, Mars and other terrestrial planets. Of special importance is the early impact bombardment history, which may have controlled when life could begin and continue to exist on the Earth (and maybe Mars). It has become very clear that many of even the largest impact structures on the Moon and Mars are not visible in images but are detectable in other data (topography, crustal thickness). It is necessary to account for these "hidden" basins in order to understand the true effects of impact bombardment on the early evolution of all the terrestrial planets. This project involves using interactive computer graphics to search topography and other data for previously unknown large and small impact basins, determining their diameters and distribution, and using this information to date planetary surfaces and assess the effects of these impacts on the structure and early evolution of the crust of the Moon, Mars and Earth, and how this relates to the possibility of very early life on the Earth (and maybe Mars).	Interest in the subject, enthusiasm for the work, ability to work with others but also, once familiar with the work, to pursue it independently and even explore new avenues that may open up. Willingness to take on work that is part of a larger team effort but for which the intern will have individual responsibility for his/her work. Desire to present and/or publish the results of the work.